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OU 7 Seep Collection/Landfill Closure IM/IRA
Technical Working Group Meeting
January 25, 1995

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AGENDA

Introductions

Seep Collection Action Memorandum/Title II Design

- Status of Document
- Status of Design
- Preferred Treatment Alternative
- Discussion

Landfill Closure IM/IRA

- Decision Matrix for Remedial Alternatives
- Modeling Results
- Cost Sensitivity Analysis for Alternative 5a
- OU 4 Cover Design
- Slurry Wall Effectiveness
- Discussion

Agency Meeting

- Presentation of Alternatives (preferred alternative or all)
- Format for Presentation
- Status of DOE Management Strategy Letters

Action Items

ADMIN RECORD

1/15

BZ-A-000424

established 1959

January 31, 1995
2510-95/16

Ms. Laurie Peterson-Wright
EG&G Rocky Flats, Inc.
P.O. Box 464, Bldg. 080
Golden, Colorado 80402-0464

Subject: Submittal of January 25, 1995 Meeting Minutes
Technical Working Group Meeting for Operable Unit No. 7
(MTS Contract 353017TB3)

Dear Ms. Peterson-Wright:

Enclosed are meeting minutes to document the January 25, 1995, technical working group meeting for the OU 7 seep collection and landfill closure interim measure/interim remedial actions.

If you have any questions, please contact me at your convenience.

Sincerely,

Myra K. Vaag
Project Manager

Enclosure

cc:	W. Bartholomew w/o	EG&G	B. Caruso	Stoller
	L. Brooks	EG&G	A. Crockett	Stoller
	R. Cygnarowicz	EG&G	M. Eisenbeis	Stoller
	T. Lindsay	EG&G	S. Franklin	Stoller
	P. Martin	EG&G	C. Gee	Stoller
	P. Corser	TerraMatrix	J. Jankousky	Stoller
	J. Kendall	TerraMatrix	D. Palmer	Stoller
			L. Ross w/o	Stoller
			B. Stephanus w/o	Stoller
			MKV Chron w/o	Stoller
			B. Stephanus w/o	Stoller
			OU7 Project File	

Minutes for the OU 7 Seep Collection/Landfill Closure IM/IRA
Technical Working Group Meeting
January 25, 1995

Stoller distributed handouts describing the four preferred alternatives and a decision matrix that compared effectiveness, implementability, environmental impacts, and conceptual costs. The following topics were discussed:

Seep Collection PAM/ Title II Design

Status of PAM - Stoller resubmitted the final PAM on January 30. Comments on the environmental impacts have been addressed as requested by the EG&G NEPA group.

Status of Title II Design - Stoller resubmitted the Title II design for the seep collection and storage facility with the appropriate signatures as requested by EG&G.

Preferred Treatment Alternative - DOE plans to present the preferred treatment alternative for seep water to CDPHE and EPA at the next meeting. EG&G received a letter from the OU 1 treatment facility operator that commits to treating the seep water at the OU 1 facility. Treatment costs will be included in the OU 1 budget. Trucking and sampling costs will be included in the OU 7 budget. Stoller still needs EG&G to provide actual treatment costs per gallon for the IM/IRA decision document for landfill closure.

Discussion - DOE/ER is reviewing the existing data for the seep at OU 7 to determine if data are fully usable and if concentrations of organic compounds warrant treatment.

Landfill Closure IM/IRA

Decision Matrix for Remedial Alternatives - A decision matrix was prepared as requested by DOE to compare effectiveness, implementability, environmental impacts, and conceptual costs of the four preferred alternatives (1a, 2a, 2d, and 5a). Conceptual costs are different than those presented last week because the cover area for alternative 5a was increased, which increased capital costs; treatment of groundwater and groundwater flows were increased, which increased O&M costs; and drains were added, which increased capital costs. Alternative 2a is the best from a total score and cost standpoint. Alternatives 1a, 2a, and 2d are essentially the same for effectiveness, implementability, and environmental impacts.

Modeling Results - Stoller recalibrated the groundwater flow model by increasing recharge and increasing hydraulic conductivities to account for increased flows at the leachate seep. The model was run using several remediation scenarios with the following results:

- No cap and no slurry wall - captured 2 gpm over 30 years
- Cap and no slurry wall - captured 1.7 gpm over 30 years
- Cap and 1E-7 slurry wall - captured 1 gpm over 30 years
- Cap and 1E-12 slurry wall - captured 0.9 gpm over 30 years

Differential heads of 10 to 15 feet built up outside the landfill. Two questions remain: (1) will the groundwater rise to the ground surface upgradient of the slurry wall as a result of the differential heads?

and (2) what pumping rate is required to keep the groundwater from rising above a predetermined elevation upgradient of the slurry wall? Stoller will perform additional modeling to answer these questions.

Slurry Wall Effectiveness - EPA is concerned about hydraulic fracturing of the slurry wall due to high differential heads. DOE suggested that adding a membrane to the slurry wall would minimize hydraulic fracturing. TerraMatrix distributed a handout that summarized potential slurry wall defects from the literature and suggested preventive measures. The depth of the proposed slurry wall at OU 7 is shallow; therefore, the risk of construction defects is probably low. TerraMatrix will determine which slurry-wall defects are applicable to OU 7 and suggest ways to prevent them from happening. TerraMatrix will also research long-term failure of slurry walls.

OU 4 Cover Design - The driver for the OU 4 cover design is the 1,000-year time period for operation due to the radioactive contaminants present in the sludge and pondcrete. The OU 7 cover design is more typical for a municipal landfill with some hazardous constituents. Modeling runs made with the new version of the HELP model result in a lower rate of evapotranspiration from the proposed OU 7 cover than modeling runs made with the earlier version. These results suggest that a synthetic layer is a necessary component of the cover design.

Cost-Sensitivity Analysis - TerraMatrix performed a cost-sensitivity analysis for the four alternatives using a hypercube simulation technique. The modeling showed that costs for all alternatives are probably low. Cost differences between the options remained the same. The cost modeling will be put on hold for now.

Agency Meeting

The agency meeting scheduled for February 2, 1995, has been postponed because EG&G has not finished preparing the management strategy letter for DOE proposing consolidation of soils and sediments under RCRA corrective action.

The DOE management strategy letter proposing abandonment of wells that fall under the footprint of the landfill cover has been sent to CDPHE and EPA for approval. DOE expects to receive a response on January 25. CDPHE questioned whether additional downgradient wells will be installed for compliance monitoring if existing wells are dry; DOE answered yes. The other management strategy letters (disposition of investigation-derived material and consolidation of soils and sediments) have not been completed.

Action Items

The formal meeting minutes are the forum for tracking action items. A list of the action item, the person responsible for the action, and the status of the action item is included below. The list will be updated weekly. When an action has been completed, it will be stated as such, and the item will be removed from the action item list the following week.

01-121 Completed.

122 Determine possible trucking route from Western Aggregates to the present landfill east of Colorado Highway 93 (T. Lindsay, EG&G). EG&G is investigating options for a trucking route in the buffer zone between Western Aggregates and OU 5 and OU 7 and plans to propose constructing a new road. NEPA approval will be required. In progress.

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123-149 Completed.

150 Obtain information regarding cover designs for Lowry Landfill, Marshall Landfill, and RMA (T. Lindsay, EG&G). EG&G provided Stoller with information on cover designs from Hanford, Los Alamos, and Marshall. In progress.

151-157 Completed.

158 Determine allowable activities for radiological contaminants in soils/sediments (L. Peterson-Wright, EG&G). The no-rad-added policy is being reconsidered based on the reorganization of the cognizant professionals. In progress.

159-163 Completed.

164 Determine if Claymax has been approved by EPA Region VIII for cap designs at other sites (P. Pigeon, DOE/PME). A hybrid cover design using Claymax has been approved at the Texaco refinery in Casper, Wyoming, which is in EPA Region VIII. However, the cover was designed for soils from a landfarm, not a landfill. Completed.

165-166 Completed.

167 Follow up on the sample of seep water collected for TOC analysis (P. Pigeon, DOE/PME).

168-171 Completed.

172 Brainstorm how the inferred fault near OU 7 will affect the movement of groundwater and the cap and slurry wall design (M. Vaag, Stoller). It appears that groundwater flows along the fault zone and discharges as a seep along the hillside north of the landfill pond. To prevent groundwater from undermining the landfill cover in this area, the slurry wall should be keyed into unweathered bedrock across the fault zone and should be lengthened to ensure that groundwater is channeled away from the cover. In addition, a membrane could be added to the slurry wall to increase its effectiveness. Completed.

173 Investigate the nature of contamination, if any, in the LHSU downgradient of the landfill using analytical results from well 53094 (J. Jankousky, Stoller). In progress.

174 Provide Stoller with O&M costs for groundwater treatment at the existing OU 1 facility (P. Martin, EG&G).

175 Provide Stoller and TerraMatrix with the Rocky Flats standard interest rate, contingency percentage, and escalation (T. Lindsay and L. Peterson-Wright, EG&G). EG&G provided Stoller with the requested information. Completed.

176 Completed.

177 Investigate why the existing slurry wall at OU 7 is not functioning properly and compile information regarding the success/failure rate of other slurry walls (P. Corser, TerraMatrix). Completed.

178 Completed.

179 Reduce the permeability of the slurry wall and use the existing groundwater model to determine if a French drain or pumping wells are necessary upgradient of the slurry wall to prevent the groundwater from surfacing west of the landfill (J. Jankousky, Stoller). It appears that groundwater will not surface west of the landfill; however, additional modeling will be conducted (see action item 183). Completed.

180 Research basis for the 1,000-year cap design at OU 4, and be prepared to show why a 1,000-year cap is not needed at OU 7 (M. Vaag, Stoller, and P. Corser, TerraMatrix). Hazardous and mixed wastes will be covered at OU 4. Materials to be covered at OU 7 are primarily municipal waste. Completed.

181 Brief new DOE OU 7 project manager (Peg Witherill) on the location and descriptions of IHSSs, the regulatory history of the site, the history of disposal and spray evaporation, and the nature and extent of contamination at the site (L. Peterson-Wright, EG&G). The briefing will take place on January 27. Completed.

182 Provide Stoller with a copy of the decision matrix for capping options from OU 5 (L. Peterson-Wright, EG&G). EG&G provided the decision matrix. Stoller modified the matrix to make it specific to OU 7. Completed.

183 Use groundwater flow model to determine how much head buildup will occur upgradient of the slurry wall. Add a drain to the flow model to decrease heads, if necessary (J. Jankousky, Stoller).

184 Research long-term failures of slurry walls (J. Kendall, TerraMatrix).

185 Determine which slurry-wall defects cited in the literature are applicable to OU 7 and what preventive measures will be taken (J. Kendall, TerraMatrix).

185 Provide Stoller with a copy of the OU 4 IM/IRA Decision Document (L. Peterson-Wright, EG&G).

186 Ask the OU 5 project manager if the agencies are aware of the inferred faults at Rocky Flats presented in the draft Geologic Characterization Report (L. Peterson-Wright, EG&G). The OU 5 project team has discussed potential faults with the agencies. Completed.

Next Meeting

The next meeting will be at 10:00 a.m. on February 1, 1995, in the EG&G small west conference room.

List of Attendees

Name	Organization	Phone
Brian Caruso	Stoller	546-4338
Mary Eisenbeis	Stoller	546-4474
John Jankousky	Stoller	546-4412
John Kendall	TerraMatrix	763-5140
Tom Lindsay	EG&G	966-6985
Peter Martin	EG&G	966-8695
Laurie Peterson-Wright	EG&G Project Manager	966-8553
Paul Pigeon	RTG/DOE/PME	966-5611
Myra Vaag	Stoller Project Manager	546-4417

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SLURRY WALL DεFECTS AND PREVENT PREVENTATIVE MEASURES

DEFECTS	PREVENTATIVE MEASURE
<u>Construction Defects</u>:	
Improperly Mixed Backfill - lumps of unmixed backfill material	- Mechanical mixers - Remote mixing location - Material sampling and testing
Slurry Entrapment During Backfill Placement - stiff backfill overrides slurry along backfill slope	- Material sampling and testing
Trench Sediments Covered by Backfill - granular fraction of slurry settles to bottom of trench	- Daily soundings and sampling of of trench bottom material
Trench Wall Instability: Surface and at Depth - caving of trench wall material at crest and at depth	- Sounding immediately prior to backfill placement
<u>Changes In Backfill Properties</u>:	
Cycles of Freezing and Thawing (wetting and drying) - ice lenses formation	- Prevented with proper design
Hydraulic Fracturing - settlement induced cracks propagated by high hydrostatic stress	- Grouting to reduce hydrostatic stress on slurry wall - Possible local variation in backfill mix design
Chemical Incompatibility - contaminant increase hydraulic conductivity backfill material	- Use of well graded backfill soil base with high fine content to minimize effects of bentonite shrinkage

ref. Evans, J.E., "Vertical Cutoff Walls", <u>Geotechnical Practice for Waste Disposal,</u> D. Daniels, ed., Chapman & Hall, 1993. ISBN 0 412 35270 6.

Alternatives Development

RESULTS OF CONCEPTUAL COST ESTIMATE

Based on the conceptual cost estimate the following alternatives were developed:

Alternative 1a:

- Cap the landfill **footprint**
- **Dam** left in place, with **culvert** for surface water flow
- **U-shaped** slurry wall stops short of dam
- Treat groundwater at OU 1/OU 2
- Collection **above and below** dam
- Consolidate soils/sediments

Alternative 2a:

- Cap the landfill footprint
- **Remove dam**
- Regrade for drainage
- **U-shaped** slurry wall stops short of dam
- Treat groundwater at OU 1/OU 2
- Collection **below** former dam
- Consolidate soils/sediments

Alternative 2d:

- Cap the landfill footprint
- **Remove dam**
- Regrade for drainage
- Treat groundwater at OU 1/OU 2
- Collection **above and below** former dam
- **Circular** slurry wall
- Consolidate soils/sediments

Alternative 5a (modified):

- Cap the landfill footprint with **swale** down center
- **Remove dam**
- Regrade for drainage
- **U-shaped** slurry wall stops short of dam
- Treat groundwater at OU 1/OU 2
- Collection **below** former dam
- Consolidate soils/sediments

OU 7 Landfill Closure
Decision Matrix

Criteria	No Action	Alternative 1a	Alternative 2a	Alternative 2d	Alternative 5a	Max.Score
Effectiveness						
Long term risk	1	5	5	5	3	5
Short term risk	4	3	3	3	2	5
Threat reduction	1	5	5	5	5	5
Length of time until protection achieved	1	5	5	5	5	5
Compliance with ARARs	1	5	5	5	3	5
Risk of potential exposure to residuals remaining onsite	1	3	3	3	3	5
Reliability over life of project	1	5	5	4	3	5
Use of alternatives to land disposal	1	3	3	3	3	5
Degree to which it reduces Toxicity, Mobility and Volume	1	3	3	3	3	5
Effectiveness subtotal	12	37	37	36	30	45
Implementability						
Technical feasibility						
Ability to construct	5	4	4	3	2	5
Ability to maintain and operate	5	4	5	4	3	5
Ability to meet goals	1	5	5	5	4	5
Demonstrated performance	1	5	5	5	2	5
Availability						
Equip., mat'ls and personnel	5	5	5	5	5	5
Adequate offsite TSD	5	5	5	5	5	5
Post remedial site controls	5	5	5	5	5	5
Administrative feasibility						
Likelihood of public acceptance	1	5	5	5	1	5
Coordination with agencies	1	5	5	5	3	5
Ability to obtain permits/approvals	1	5	5	5	3	5
Implementability subtotal	30	48	49	47	33	50

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Environmental Impacts						
Air Quality	2	4	4	4	3	5
Water Quality	1	5	5	5	5	5
Terrestrial and Aquatic Impacts	1	1	1	1	3	5
Threatened and Endangered Species	5	3	3	3	3	5
Cultural Resource	N/A	N/A	N/A	N/A	N/A	0
Short and Long Term Productivity	N/A	N/A	N/A	N/A	N/A	0
Exposure Pathways	1	5	5	5	5	5
Commitment of Resources	5	1	1	1	1	5
Transportation Impacts	5	1	1	1	3	5
Wetlands and Floodplains Impacts	3	2	2	2	2	5
Environmental Impacts subtotals	23	22	22	22	25	40
Total Score	65	107	108	105	88	135
Weighted Percent	47%	79%	80%	78%	66%	100%
Cost						
Capital	$0	$11,202,559	$11,315,305	$11,523,879	$13,888,547	
PW of O&M	$0	$20,306,400	$13,657,100	$16,911,600	$14,795,900	
Total Present Worth	$0	$31,508,959	$24,972,405	$28,435,479	$28,684,447	
Cost ranking	5	1	4	2	3	

Alternatives Development

COMPARATIVE ANALYSIS OF FIVE ALTERNATIVES

Alternative 1a:
- **Dam** left in place, with culvert for surface water flow
- **U-shaped** slurry wall stops short of dam
- Groundwater collection **above and below** dam

EVALUATION

Effectiveness:

1. Positive:

⇒ Dam continues to provide a barrier which may be benificial post clean-up.
⇒ Second collection system provides backup in case of failure.
⇒ Provides somewhat higher flows (1.74 gpm) to the groundwater collection system, therefore although not more effective in the long run, it has the potential to be cleaned up in shorter period (although it may not be w/i the assumed 30 year life of project)
⇒ Grading provides positive drainage off cover even after settlement (5% post-settlement).
⇒ Placement of fill at toe of slope will facilitate buttressing the unstable slopes below the north asbestos area.

2. Negative:

⇒ Groundwater collection above and below dam will result in increased O&M costs.
⇒ Depending on the permeability characteristics of the general fill material, an additional gas collection layer may be required.
⇒ The surface water drainage will require construction of a culvert or notch through the embankment to provide gravity flow out of the pond.

Implementability:

1. Positive:

⇒ All aspects of the alternative are technically and administratively feasible.

2. Negative:

⇒ Construction will require that some surface drainage features be relocated and some new channels designed.

Environmental Impact:

1. Positive:
2. Negative:

⇒ The need for off-site material will result in substantial disturbance of the borrow area. Required fill volume is 224,162 CY.

Cost:

⇒ Capital cost is $11,202,600.
⇒ Present Worth of O&M over 30 years is $20,306,400.
⇒ Total Present Worth cost is $31,509,000.

Alternative 2a:

- **Remove dam**
- **U-shaped** slurry wall stops short of dam
- Collection **below** former dam

Effectiveness:

1. Positive:

⇒ Grading provides positive drainage off cover even after settlement (5% post-settlement).

⇒ Placement of fill at toe of slope will facilitate buttressing the unstable slopes below the north asbestos area.

⇒ The excavation of fill from the embankment will help to reduce the material in-balance.

2. Negative:

⇒ Provides lower flows (1.04 gpm) to the groundwater collection system, therefore although equally as effective in the long run, it may take longer to be cleaned up.

⇒ Increase in short term risk due to regrading.

⇒ Depending on the permeability characteristics of the general fill material, an additional gas collection layer may be required.

Implementability:

1. Positive:

⇒ All aspects of the alternative are technically and administratively feasible.

2. Negative:

⇒ Construction will require that some surface drainage features be relocated and some new channels designed.

Environmental Impact:

1. Positive:

⇒ Removal of the embankment will result in a more natural, long lasting, surface water drainage feature.

2. Negative:

⇒ The need for off-site material will result in substantial disturbance of the borrow area Required fill volume is 243,480 CY.

Cost:

⇒ Capital cost is $11,315,400.

⇒ Present Worth of O&M over 30 years is $13,657,100.

⇒ Total Present Worth cost is $24,972,500.

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Alternative 2d:

- **Remove dam**
- **Circular** slurry wall
- Collection **above and below** former dam

Effectiveness:

1. Positive:

⇒ Second collection system provides backup in case of failure.
⇒ Provides somewhat higher flows (1.37 gpm) to the groundwater collection system, therefore although not more effective in the long run, it has the potential to be cleaned up in shorter period (although it may not be w/i the assumed 30 year life of project)
⇒ Grading provides positive drainage off cover even after settlement (5% post-settlement).
⇒ Placement of fill at toe of slope will facilitate buttressing the unstable slopes below the north asbestos area.
⇒ The excavation of fill from the embankment will help to reduce the material in-balance.

2. Negative:

⇒ Increase in short term risk due to regrading.
⇒ Groundwater collection above and below dam will result in increased O&M costs Depending on the permeability characteristics of the general fill material, an additional gas collection layer may be required.

Implementability:

1. Positive:

⇒ All aspects of the alternative are administratively feasible.

2. Negative:

⇒ Construction will require that some surface drainage features be relocated and some new channels designed.

Environmental Impact:

1. Positive:

⇒ Removal of the embankment will result in a more natural, long lasting, surface water drainage feature.

2. Negative:

⇒ The need for off-site material will result in substantial disturbance of borrow area. Required fill volume is 243,480 CY

Cost:

⇒ Capital cost is $11,523,900
⇒ Present Worth of O&M over 30 years is $16,911,600.
⇒ Total Present Worth cost is $28,435,500.

Alternative 5a (modified):
- **Remove dam**
- **U-shaped slurry** wall to dam2
- Collection **below** former dam

Effectiveness:
1. Positive:
2. Negative:

⇒ Increased short term risk during regrading of landfill mass. Contamination unknown, rads metals, VOCs hits in well..
⇒ Increased potential for infiltration through the cap due to increased retention time of surface water on the cap. The installation of a low permeability layer may address this issue.
⇒ Cover components are placed in tension as a result of settlement, resulting in potential increase in long term risk to cap integrity.
⇒ Increased O&M costs to monitor cap.

Implementability:
1. Positive:
2. Negative:

⇒ Implementation would require regulatory agency approval for design slopes below guidance.
⇒ Potential negative public perception of moving landfill waste which is potentially contaminated.
⇒ Contamination levels are unknown. Rads, metals and volatile organics are anticipated.

Environmental Impact:
1. Positive:

⇒ Required fill volume is 23,413 CY. Minimizing fill volume decreases environmental impacts to borrow areas.

2. Negative:

⇒ The overall footprint of the landfill is increased due to the proposed waste transfer operations.

Cost:
⇒ Capital cost is $13,888,600. Costs are highly sensitive to H&S issues related to moving landfill waste and may increase significantly in response to monitoring and regulatory requirements.
⇒ Present Worth of O&M over 30 years is $14,795,900.
⇒ Total Present Worth cost is $28,684,500.